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REPORT OF LESSONS LEARNED: 1986 SAN SALVADOR EARTHQUAKE

OFFICE OF U.S. FOREIGN DISASTER ASSISTANCE

JANUARY, 1987

## San Salvador Earthquake: Lessons Learned

### SITUATION

Two strong earthquakes struck the capital city of San Salvador in El Salvador on October 10, 1986. The first tremor registered 5.4 on the Richter Scale at 11:49 a.m. local time and was centered about 10 miles northwest of the capital; and the second tremor registered 4.5 at 12:04 p.m. in the same vicinity. The earthquakes were felt in the neighboring countries of Honduras and Guatemala.

Major damage was centered primarily in a 20-square block area in downtown San Salvador. Major structural damage also was reported southeast of the capital, including the residential neighborhoods of San Jacinto, San Marcos, and Modelo. The quake killed approximately 1000 people, injured an estimated 10,000 people, and left about 150,000 people homeless. Government buildings, the U.S. Embassy, hospitals, schools, and houses suffered severe and extensive damage.

On October 10, 1986, AID's Office of U.S. Foreign Disaster Assistance (OFDA) convened a 24-hour El Salvador Earthquake Working Group to coordinate assistance for disaster victims in El Salvador. The State Department established a Task Force to respond to the needs of U.S. Embassy and AID personnel in El Salvador.

OFDA dispatched the following personnel to assist with disaster assessment and search and rescue efforts:

1. Five-member assessment team from Costa Rica.
2. Four dog teams plus coordinator from east coast.
3. Post-incident stress expert from University of Maryland.
4. Five-member rescue team from Metro Dade Fire Department, Florida.

### LESSONS LEARNED MEETING

On November 18, 1986, a "San Salvador Lessons Learned" meeting was held at the Office of U.S. Foreign Disaster Assistance, Washington, D.C., to:

1. Identify opportunities and issues related to the earthquake that occurred in El Salvador on October 10, 1986.
2. Recommend actions that will strengthen future search and rescue and relief responses.

Participants at the meeting included the following individuals who had been dispatched to San Salvador by OFDA:

Alejandro James	Assessment Team
Bill Dotson	Dog Team Coordinator
Phil Audibert	Dog Handler
Beth Barkley	"
Caroline Hebard	"
Hide Yamaguchi	"
John Carroll	Metro Dade
Doug Jewett	"
Glen Patton	"
Dr. Jeff Mitchell	Emergency Health Services University of Maryland

Other participants included representatives of OFDA, FEMA, USDA, & NASAR (see attendance list in Appendix).

### IDENTIFICATION OF OPPORTUNITIES

Participants identified the following opportunities related to the search and rescue experience in San Salvador:

1. Rapid dispatch had dog team on site in 20 hours.
2. Dispatching the assessment team was productive.
3. Training
  - o Determine the availability of a search and rescue simulation center for training.
  - o Identify and train people to implement an emergency management system.
  - o Train embassy people to make effective assessments of emergencies.
  - o Schedule a one day orientation session for search and rescue dog personnel.

- o The international search and rescue symposium in Orlando, Florida, May, 1987, can offer important problem solving and educational opportunities.
- 4. Consider the dispatch of a communication team.
- 5. Consider the dispatch of atmosphere detectors for toxic and explosive environments.
- 6. Consider dispatching self contained breathing apparatus.
- 7. An expert on post-incident stress was dispatched to provide psychological support.

#### IDENTIFICATION OF ISSUES

Participants identified the following issues related to the search and rescue experience in San Salvador:

1. Personnel need an advance briefing, at departure and upon arrival in country, to better prepare them for conditions within the emergency environment.
2. Dispatch sufficient rescue personnel to initially provide greater search and rescue coverage and later provide shifts so that people gain adequate rest.
3. Need to establish a unified command structure to better integrate and prioritize the emergency relief actions of local government agencies, U.S. Embassy, USAID Mission, OFDA and international donors. Implementing an emergency management system is a critical need.
4. Need to pre-position search and rescue support equipment.
5. Develop some sort of uniform that can provide instant visual recognition.
6. Improve communications: on-site and to the U.S.
7. Provide adequate heavy rescue equipment.
8. Establish a smooth de-mobilization process.
9. Organize, manage, and coordinate the relief activities of international donors.

10. How far should OFDA dispatch search and rescue personnel (e.g., Taiwan or Turkey)?
11. What is the best way to notify dog team personnel of a dispatch?
12. What is the best way to handle liability coverage for search and rescue personnel?
13. How can personnel be dispatched in a more timely manner?
14. What are ways to inform Missions of emergency relief roles and responsibilities for Missions and OFDA.
15. How should OFDA fulfill public relations role at emergency site?
16. How should international search and rescue standards be established?
17. What other organizations can provide a heavy rescue capability to provide back-up to Metro Dade?
18. What is the best process to use in re-conditioning search and rescue equipment belonging to organizations (i.e., the dog team's radios)?

#### GROUPING OF OPPORTUNITIES AND ISSUES

Participants at the meeting proposed to group the opportunities and issues under four major headings: mobilization, emergency management, incident support, and training:

##### MOBILIZATION

- o Advance Briefing
- o Dispatch Sufficient Personnel
- o Pre-Position Support Equipment
- o How Far To Dispatch Personnel
- o Dispatch Notification
- o Timely Dispatch

#### EMERGENCY MANAGEMENT

- o Implement an Emergency Management System
- o Provide Communication Team
- o Establish De-Mobilization Process
- o Facilitate Relief Efforts of Donors
- o Fulfill Public Relations Role

#### INCIDENT SUPPORT

- o Develop Uniform
- o Dispatch Communication Equipment (Satellite System and Radios)
- o Provide Adequate Heavy Rescue Equipment
- o Liability Coverage
- o Inform Missions of Emergency Roles and Responsibilities
- o Re-Condition Search and Rescue Equipment
- o Provide Atmosphere Detectors When Appropriate
- o Provide Self-Contained Breathing Apparatus When Appropriate
- o Develop International Search and Rescue Standards

#### TRAINING

- o Develop Search and Rescue Simulation Training For Dog Teams in a Rubble Environment
- o Identify and Train People to Operate an Emergency Management System
- o Train Embassy Personnel to Make Effective Assessments of Emergencies
- o Schedule One Day OFDA Orientation Session for Dog Handlers
- o Problem Solving and Educational Opportunities at International Search and Rescue Symposium, May, 1987
- o Plan for Dog Handler Trainee Assignments on Dispatches
- o Determine Feasibility of a Training Environment for Dogs with Dead People (Cadavers)
- o Provide cross training opportunities during Emergency Relief to Enhance Credibility, Trust, and Understanding Among Search and Rescue Personnel

#### MOBILIZATION

Six mobilization issues were identified:

1. Advance Briefings. It is important that emergency relief personnel be well briefed on their assignment prior to

undertaking search and rescue and relief actions. People will be better prepared to carry out emergency relief assignments effectively, if they are well informed:

- . Transmit available information to emergency personnel prior to departure by phone or at airport
- . USAID Mission should brief emergency personnel upon arrival in the country
- . Develop a briefing packet to give to emergency personnel at departure (situation report, country profile, maps, embassy contacts, survival language phrases, etc.)

2. Dispatch Sufficient Personnel. Sufficient personnel should be dispatched to provide adequate search coverage early in the incident; and adequate staffing of shifts later in the incident to insure that people receive adequate rest. It is helpful to define an optimum working unit (strike team) for various kinds of resources, so that numbers can be scaled up or down by multiples of strike teams depending on incident requirements. Thus, a strike team of dog handlers and dogs might be configured in this manner:

1. Dog team = 1 handler and 1 dog
2. Field team = 2 dog teams and 1 overhead position
3. Strike team = 2 field teams and 1 strike team leader (this equates to 4 handlers, 4 dogs, 2 overhead positions, and 1 strike team leader)

A heavy rescue strike team might be composed of a strike team leader and 4 sector leaders. Each sector leader would be responsible for communications, equipment support, etc. Defining strike teams in this manner helps everyone better understand and plan for the mobilization and de-mobilization of emergency personnel.

3. Pre-Position Support Equipment. Several who participated in search and rescue operations in San Salvador expressed a need for pre-positioned equipment that would be dispatched to support search and rescue personnel. The following types of supplies and equipment were suggested for inclusion as search and rescue support items:

1. Tents
2. Food
3. Radios
4. Hard Hats
5. Gloves
6. Flashlights
7. First Aid Kits
8. Water Purification Kits
9. Sleeping Bags
10. Respiration Masks (with charcoal filters)
11. Mosquito Netting
12. Medication for Dogs
13. Personal Survival Kits
14. Fresh Water

4. Dispatch Distance. The question was raised at the meeting as to how far OFDA should dispatch search and rescue personnel. In other words, would OFDA dispatch the same type of search and rescue operation to Turkey or Taiwan that was sent to El Salvador? This is a policy question that needs to be answered.

5. Dispatch Notification. The dog strike teams will be notified of a dispatch by OFDA contacting the Rescue and Recovery Command at Scott Air Force Base. Alert procedures are covered in the recently prepared pre-plan for dog teams (OFDA has copies of this document). Alert procedures, dispatch procedures, or both can be activated through Scott Air Force Base.

6. Timely Dispatch. Although the dog teams were transported to El Salvador in a timely manner, this was not true of the assessment team that waited at the airport in Costa Rica for over 7 hours for air transportation. Defense Department, commercial, and charter are all viable forms of air transportation. Measures should be taken to line up various options in advance.

## EMERGENCY MANAGEMENT

The five issues listed under emergency management included implementation of an emergency management system, providing a communication team, establishing a de-mobilization process, facilitating relief efforts of donors, and fulfilling the public relations role at the disaster site. Carrying out the first issue, implementing an emergency management system, is the most direct way to assure that the other four issues also are resolved. When an emergency management system like ICS is activated, the functions of communications, de-mobilization, coordination, and public relations are automatically accommodated.



as integral parts of the system. So in addition to sending search and rescue teams and heavy rescue teams, it is also important to dispatch a command team that has the ability to organize all of the planning, logistic, and operational requirements related to the disaster. This type of emergency management organization allows the search and rescue teams to concentrate primarily on finding survivors.

### INCIDENT SUPPORT

Nine issues were identified as needing attention to improve the support of people who provide emergency relief at a disaster site:

1. Developing a uniform to be worn by OFDA - dispatched personnel at the disaster site. The feeling was rather widespread among search and rescue personnel at the disaster in San Salvador that a uniform is needed to quickly identify the members of the U.S. disaster team. A uniform would readily provide visual recognition of team members by other members, host government officials, international donors, other emergency relief personnel, and the media. Communications, safety, and disaster management all could be enhanced by adopting some form of consistent uniform.
2. Dispatch communication systems to the disaster (both satellite equipment and radios). Communications, especially between San Salvador and the U.S., were very difficult at first because of the earthquake damage to communication facilities. Eventually satellite communications were established that provided for the excellent two way exchange of information between San Salvador and Washington, D.C. Establishing clear lines of communication in-country and with Washington, D.C. are an invaluable asset in facilitating effective management of relief efforts. Procedures need to be established in advance to provide for the dispatch of satellite and radio equipment with trained operators. Satellite equipment should be deployed with a data transmission capability to improve the efficiency of such communications. Data transmission equipment provides hard copies at each end and a much faster communication rate.

3. Provide adequate heavy rescue equipment. The problem in relation to San Salvador was one of providing closure on orders at each end. A process needs to be implemented that verifies each stage of an order from request to receipt.
4. Liability coverage. The issue of liability coverage for search and rescue team members who might be injured at the disaster site was raised for clarification.
5. Inform missions of emergency roles and responsibilities. Mission personnel can play a valuable role in briefing arriving emergency relief teams, assisting with assessments, arranging for key contacts and meetings, providing transportation, and furnishing other support. These roles and responsibilities need to be clearly understood by the Mission. Also, mission personnel need to understand the roles and responsibilities of OFDA in responding to disasters.
6. Re-condition search and rescue equipment. The dog teams took a certain amount of support equipment with them to San Salvador, like radios, that may need to be re-conditioned upon returning to the U.S. What is the procedure that volunteer groups should follow in getting support equipment refurbished following a disaster relief assignment?
7. Provide atmosphere detectors and self-contained breathing apparatus when appropriate. When search and rescue teams are conducting operations in a rubble/fire environment, it will be necessary to protect them from toxic materials and explosions. A checklist of personal protective equipment could be developed for various disaster types to use as a dispatching guide.
8. Develop international search and rescue standards. A set of search and rescue standards does not exist at this time. Such standards could be very helpful in designing training, qualifying search and rescue personnel, conducting operations, and coordinating the efforts of international donors.

## TRAINING

Several training issues or opportunities were proposed by participants at the "Lessons Learned" Conference:

1. Develop search and rescue simulation training for dog teams in a rubble environment. The primary training experience for dog teams generally has occurred in a wilderness environment. Since dog teams have proved to be especially helpful in locating survivors following earthquakes in Mexico and El Salvador, it would be very helpful to locate or develop training opportunities in a simulated rubble environment.
2. Identify and/or train people to implement an emergency management system at the disaster site. As noted earlier, many of the disaster relief issues that arose in El Salvador occurred because an emergency management system was not in place. Such potential problem areas as communications, international coordination, public relations, de-mobilization, and in-country logistic support would normally be staffed and routinely handled under the organizational structure provided by an emergency management system. Alternatives for handling this issue will be presented in the action plan.
3. Train Embassy/Mission personnel to make effective assessments of disasters. Early and comprehensive assessments are critical in providing OFDA with the necessary information to quickly determine the appropriate planning, operational, and logistical requirements needed to provide disaster relief. Knowledgeable Embassy/Mission personnel can provide a preliminary assessment link to OFDA until the OFDA team arrives on site. Training, checklists, or briefing guidelines could be developed to better prepare people to provide this preliminary assessment.
4. Schedule one day OFDA orientation session for dog handlers. An OFDA orientation would provide an excellent training opportunity to better prepare dog handlers and coordinators to understand established disaster relief procedures related to mobilization, emergency management organization, and incident support.

5. International search and rescue symposium, May, 1987. This symposium will provide good opportunities for problem solving and information exchange at the international level. New insights might be developed regarding such issues as search and rescue standards, international coordination of relief efforts, and simulated training in rubble environments.
6. Plan for dog handler trainee assignments on dispatches. Excellent opportunities exist to establish a pool of trainees for search and rescue assignments. The trainee pool could be tapped at the time of dispatch to provide individuals with valuable search and rescue training as a member of an experienced team. One trainee assignment was handled on the dispatch to San Salvador.
7. Determine the availability of a training environment for dog teams with dead people (cadavers). Again, most of the training opportunities for dog teams are in wilderness environments with living "victims". The training experience could more closely approximate actual conditions, if some training exercises were scheduled with cadavers.
8. Provide cross training opportunities. Where feasible some cross training opportunities could be scheduled during disaster relief efforts to enhance credibility, trust, and understanding among search and rescue personnel.

#### SUMMARY

Participants at the San Salvador Earthquake Lessons Learned Conference held at the Office of U.S. Foreign Disaster Assistance on November 18, 1986, identified 28 opportunities and issues that were grouped under 4 major headings. The major headings included mobilization, emergency management, incident support, and training. Many of the same issues that were identified following the earthquake in Mexico City also became problems in San Salvador. Some action items already are underway to develop briefing packages, procure search and rescue support equipment, develop an emergency management training course, and secure the dispatch availability of communication equipment.

These actions will strengthen OFDA's capabilities in mobilization, emergency management, incident support, and training, but the fact remains that disasters know no schedule and one could occur tomorrow. It will be important to translate the 28 opportunities and issues into an action plan that implements feasible alternatives in a timely manner.

A P P E N D I X

SAN SALVADOR LESSONS LEARNED MEETING  
NOVEMBER 18, 1986  
10 a.m. - 4 p.m.  
OFFICE OF U.S. FOREIGN DISASTER ASSISTANCE  
ROOM 1262-A, STATE DEPARTMENT  
PHONE (202) 647-5916

OBJECTIVES:

1. To identify issues and opportunities related to the earthquake that occurred in El Salvador on October 10, 1986.
2. To recommend actions that will strengthen future search and rescue and relief responses.

AGENDA

1. Welcome and Opening Remarks	Julia Taft	10:00 a.m.
2. Objectives and Expectations	Alan Swan	10:15
3. Issue Identification	Bob Mutch	10:30
4. Videotape of Search and Rescue Activities	Doug Jewett	10:45
5. Assessment Team Report	Alejandro James	10:55
6. Dog Team Report	Bill Dotson	11:10
7. Dade County Team Report	Doug Jewett	11:25
8. Recommendations: Open Discussion	All	11:40
9. Lunch		12:00-1:00
10. Critical Incident Stress Support	Jeff Mitchell	1:00
11. Recommendations: Open Discussion	All	1:15
12. Summary	Alan Swan	3:30
13. Wrap-Up	Julia Taft	3:45

# PARTICIPANTS

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE NUMBER</u>
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Alejahandro James, Jr.	OFDA	
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Douglas M. Jewett	Metro Dade-C-FD	596-8671
W.M. Dotson	NASAR-US Dog Team -	804-985-3893 (H)
	Dogs East	703-298-1211 (W)
		Ext. 4202



Caroline Hebard	NASAR - US Dog Team	201-766-7125
	Sar K-d Service	
Paul Krumpe	AID/OFDA	202-647-9758
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Hidero Yamaguchi	NASAR - US Dog Team	301-277-9392
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Jim Rooney	NASAR	703-961-5710
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	Blacksburg, Virginia 24060	
Ed Koenigsberg	OFDA	202-647-7544

## DOG TEAM REPORT - EL SALVADOR

### CHRONOLOGY

Saturday, 11 Oct 1986:

- Arrive at Andrews AFB 0300 hours
- Leave Andrews AFB 0545 hours
- Arrive San Salvador Llopango Airport 0810 hours
- Arrive at Ruben Dario Site 0845 hours
- Arrive Casa Presidente Ministry of Planning 1045 hours
- Arrive Gran Hotel San Salvador 1315 hours
- Arrive Presidente Hotel approximately 1900 hours

Sunday, 12 Oct 1986:

- Spent most of the day at Ruben Dario site
- Also searched "Pete's" and "Edificio Duenas"
- Swiss arrive

Monday, 13 Oct 1986:

- Start of frustrations with Swiss at Ruben Dario
- Spent most of day at Gran Hotel San Salvador
- Also searched again at "Edificio Duenas" and went by school in Barrio San Jacinto

Tuesday, 14 Oct 1986:

- No work - negotiations went on all day to resume work at Ruben Dario

Wednesday, 15 Oct 1986:

- Spent most of day at Ruben Dario site
- Hold "summit" meeting at "First Ministers" office early a.m. - the Swiss did not attend
- Begin cooperative effort to take building apart
- Stay on the job until 0100, 16 Oct 1986

Thursday, 16 Oct 1986:

- Work at Ruben Dario in a.m. - meet Secretary Schultz and Ms. Taft
- Leave San Salvador Airport at approximately 1630 hours

Friday, 17 Oct 1986:

- Arrive Andrews AFB approximately 0430 hours

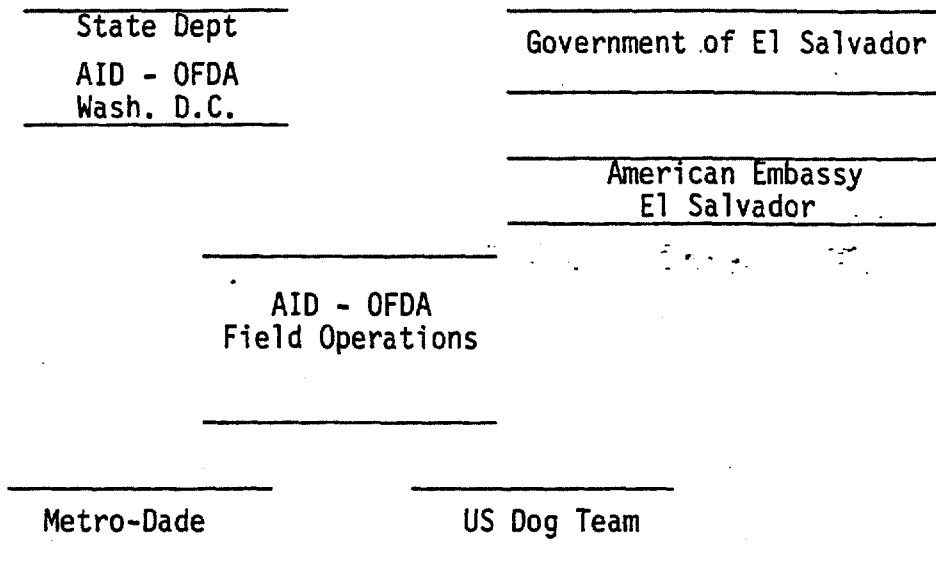
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DOG TEAM REPORT - EL SALVADOR  
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DIRECTION AND CONTROL

Our perception of the command structure was as follows:



We worked with and at the direction of the Metro-Dade firefighters at the Ruben Dario site, but we also searched at other sites with our own internal command structure. We worked easily with Metro-Dade and with respect for their abilities. Metro-Dade functioned at Ruben Dario as on-site command, coordinating the efforts of various specialty and volunteer teams. We were directed as to which sites to search by our OFDA coordinator, Alejandro James. We assume that priorities were assigned by the El Salvador government. This caused some frustration for the team as some of the "priority sites" were only slightly damaged and at the same time we continually heard of a school which had been damaged. We did not see this school until 4 days post-quake - it had by then been completely leveled and trucked away.

From the several different lists of buildings or sites (to be searched) and the lack of good directions, it was evident that accurate assessments had not been made and that an overall plan was not in effect. At the least, these plans and assessments, if made, were not being communicated to the field.

Crowd control was not adequate until the third or fourth day; thereafter it was quite good.

International cooperation was very good, except for the very notable exception of the Swiss. The international cooperative aspect must be addressed. The dog teams will attempt to further cooperation in May 1987 with an International Disaster Dog Symposium.

### EFFECTIVENESS

The major component of our effectiveness in San Salvador was the speed at which OFDA responded. The dog team was at the Ruben Dario site approximately 20 hours after the first and major tremor. We were quickly moved from site to site assessing and completing initial and, as it turns out, our most fruitful efforts. Six of the eight live indications were within our first day of work. As time of arrival enhanced our efforts, the Swiss problem degraded our effectiveness both psychologically and physically. As you may note, we did absolutely nothing on the fourth day.

We also feel that we could have been more effective if we had been able to search in some of the poorer and outlying areas. We appreciate that the political climate is such that we couldn't be put into that potential danger. We know of areas that hadn't been communicated with for 4-5 days after the quake. These same areas had live people extricated at that time.

The US Dog Team in 6 days indicated the location of 8 live persons and numerous (>20) deceased persons. The dog teams worked well for 10-12 hours each day; however, as is the nature of disaster work there is of necessity, much hurry-up-and-wait.

### LIAISON

In a word - EXCELLENT! Both OFDA personnel and embassy staff were extremely helpful and supportive. Lodgings were excellent and, in the field, all our needs were met.

### SUGGESTIONS FOR FUTURE MISSIONS

1. Improve aided country to US communications
2. Improve international cooperation.
3. Institute an internationally acceptable command structure
4. Institute a "Damaged Area Team" to prioritize and map out the damaged areas.
5. Better and quicker backup of dog teams and quickly form into three 8-hour shifts.

### TEAM MEMBERS

Bill Dotson - Team Operations Leader  
Beth Barkley - Panda  
Caroline Hebard - Ali  
Hide Yamaguchi - Shiro  
Phil Audibert - Matt